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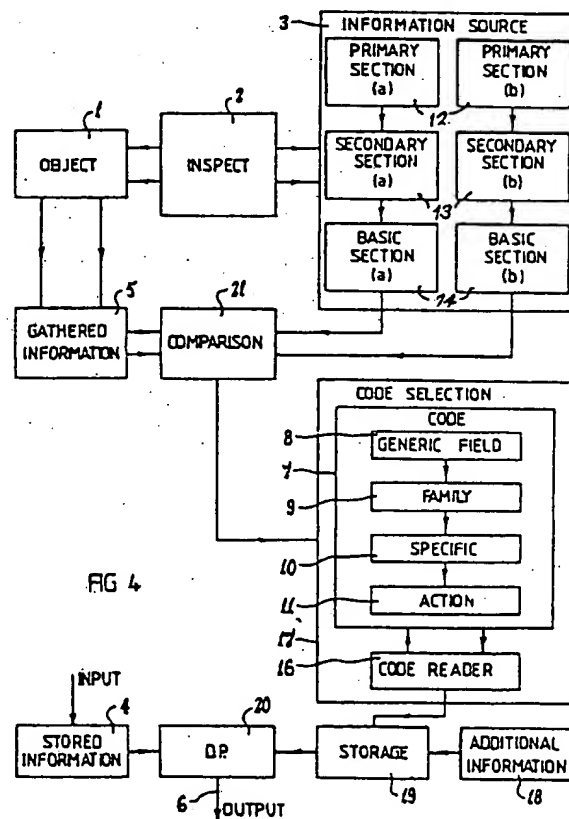
(58) Field of search

G4A

Selected US specifications from IPC sub-class G06F

(54) Data processing system

(57) A data processing system involving visual comparison of an object 1 such as a building with information contained in a diagnostic manual 3 or similar printed material. The comparison is a visual one and will usually be a step-by-step comparison between individual aspects of the object and corresponding information given in the diagnostic manual. The diagnostic manual contains bar-codes 7, each of which is unique to a particular aspect involved in the inspection and comparison previously referred to. The person conducting the inspection selects codes 7 as appropriate during the course of the inspection and causes the code information to be transmitted to a data processor 20. Pre-established information 4 from another source is also received by the data processor and the two groups of received information are related so as to produce an output 6 comprising useful data, representing the cost and/or time required for replacement or repair of part(s) of the building.



GB 2 197 513 A

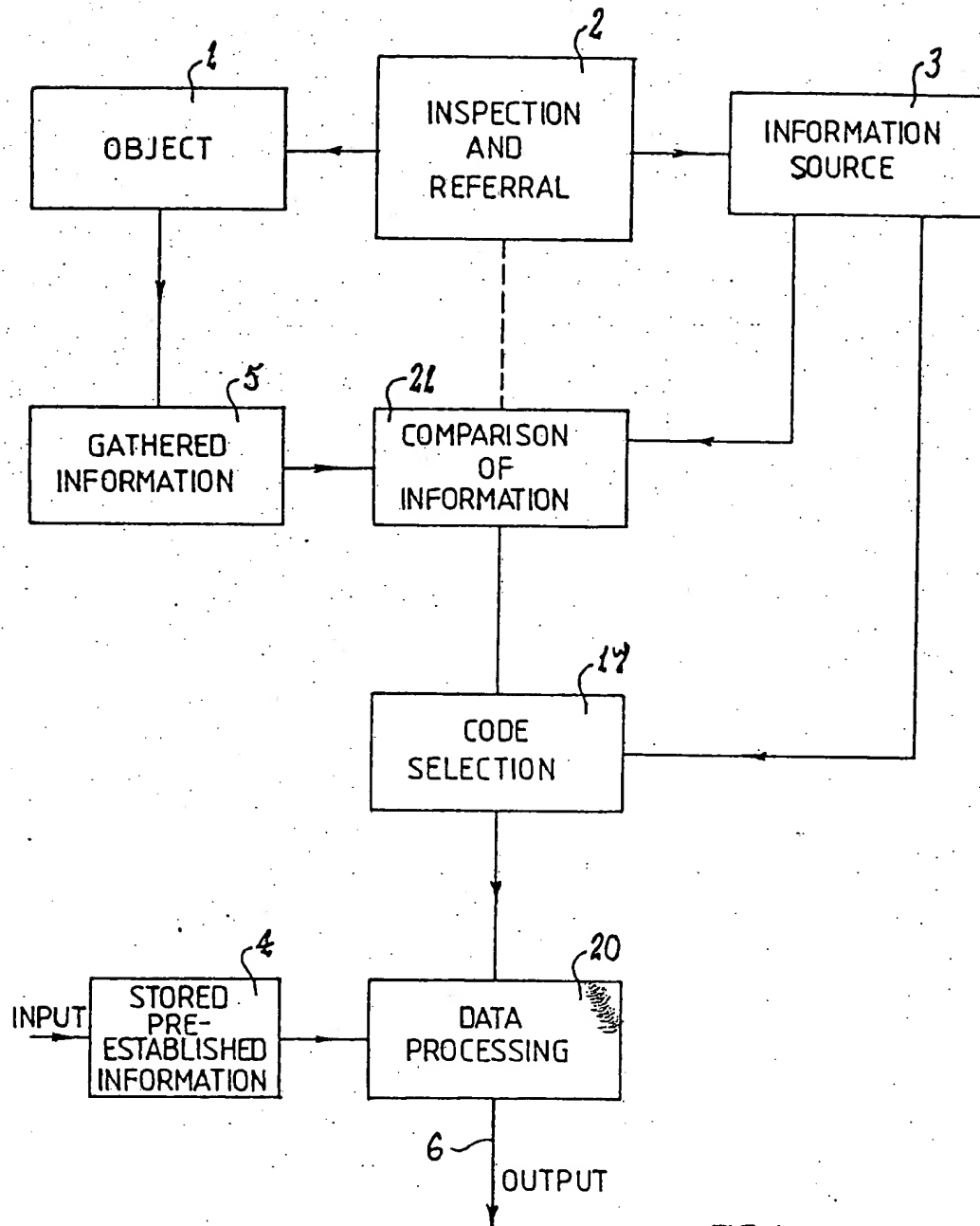


FIG 1

2197513

2/4

PHOTOGRAPH
OF
DAMAGED
GUTTER

Envelope : External
Element : Roof
Fault : 1. Damaged gutter
2. Deteriorated paint
Possible Cause of Fault : 1. Life expectancy of materials
2. Water ponding in gutter
3. Leakage at joint
Remedy : 1. Refix existing
2. Repaint gutter, eaves and fascia
Remedy Code : 1. RF63
2. RF51

PHOTOGRAPH
OF
DAMAGED
GUTTER

Envelope : External
Element : Roof
Fault : Damaged gutter
Possible Cause of Fault : 1. Life expectancy of materials
2. Impact
Remedy : Replace with new
Remedy Code : RF64

PHOTOGRAPH
OF
DAMAGED
DOWNPIPE

Envelope : External
Element : Roof
Fault : Damaged downpipe
Possible Cause of Fault : 1. Life expectancy of materials
2. Impact
3. Protective coatings poorly applied
Remedy : Replace with new
Remedy Code : RF66

FIG 2


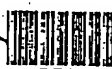
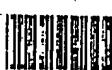





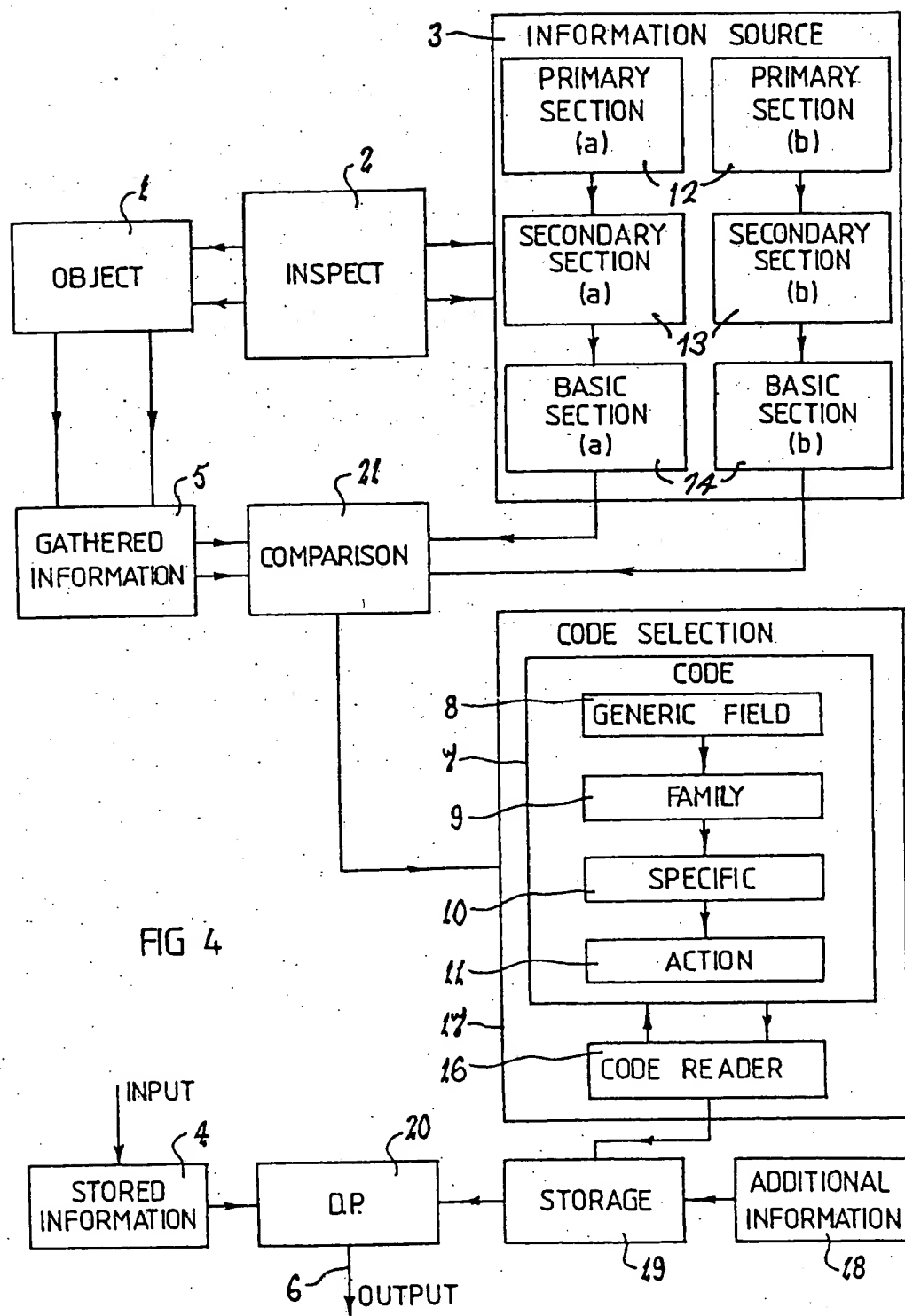
RF61	M ¹⁵	Refix loose flashing.	
RF62	M	Replace damaged flashing with new.	
RF63	M	Refix loose gutter.	
RF64	M	Replace damaged gutter with new.	
RF65	NO	Refix loose downpipe.	
RF66	M	Replace damaged downpipe with new.	
RF67	NO	Repair damaged connection to drain.	
RF68	NO	Repair damaged rainwater head.	

FIG 3



SPECIFICATION

Data processing system

- 5 This invention relates to systems which receive, possibly store, and process information. Such systems are commonly referred to as data processing systems and generally involve the use of electronic processing equipment.
- 10 Data processing systems are used for a wide variety of purposes, but their application is generally limited by the extent of human intervention necessary to identify and/or classify information to be processed by the system and/or interpret data retrieved from the system processing section. Because of those limitations, electronic data processing has remained unavailable in many fields of endeavour which could benefit from rapid and accurate processing of information.
- 15 Example situations to which electronic data processing has so far enjoyed limited application are those involving maintenance and/or repair assessments. Such assessments are generally highly labour intensive because of the need for manual inspection of the matter to be maintained or repaired, and manual recordal and evaluation of the information gathered in the course of that inspection. Furthermore, because of the nature of the exercise, it is generally necessary for the inspection to be carried out by a suitably qualified person.
- 20 It is an object of the present invention to expand the useful application of electronic data processing to situations involving complex items of information. It is a further object of the invention to provide a convenient to use and effective processing system for maintenance and/or repair assessments.
- 25 A system according to the invention can be applied to a wide variety of situations other than those involving maintenance and/or repair assessment. Furthermore, in the case of such assessment situations, the assessment may relate to maintenance and/or repair for any of a variety of purposes such as for buildings, other structures, equipment, machinery and other plant. It will be convenient to hereinafter describe the invention with particular reference to the maintenance and repair of buildings such as school buildings, but as will be apparent from the foregoing, that is an example application only of the invention.
- 30 According to one aspect of the present invention, there is provided a data processing system including use of means for storing information, data processing means, and an information source which provides a visually recognisable identification of each of a number of aspects of an object and allocates a unique code to each such aspect, said system involving electronic storage of pre-established information in said information storing means, visual inspection of a said object, visual referral to said information source as required during

ing said inspection to determine the said code of at least one said aspect of said inspected object, transmitting a signal which is representative of said determined code to said data processing means, causing said data processing means to relate said signal to said pre-established information so as to thereby produce useful data, and extracting said useful data from said data processing means.

- 70 According to a further aspect of the invention, there is provided a data processing system including the steps of electronically storing pre-established information, gathering additional information by visual inspection of an object, referring to a pre-prepared information source which allocates a unique code to each of several aspects of a said object, visually comparing said gathered information with information contained in said information source and selecting at least one said code as a consequence of that comparison, and causing data processing means to electronically process said pre-established information together with information representative of said selected code so as to thereby produce useful data.

An embodiment of the invention is described in detail in the following passages of the specification which refer to the accompanying drawings. The drawings, however, are merely illustrative of how the invention might be put into effect, so that the specific form and arrangement of the various features as shown is not to be understood as limiting on the invention.

In the drawings:

Figure 1 is a block diagram of one system according to the invention.

- Figure 2 is an illustration of a typical page of a diagnostic manual forming the information source of the system of Figure 1.

Figure 3 is an illustration of another page of the diagnostic manual.

- Figure 4 is a view similar to Figure 1 but showing the system in more detailed form.

The block diagram of Figure 1 is representative of a typical system according to the invention. The block 1 marked "object" represents the object to be inspected and for which repair and/or maintenance is to be assessed. In the example situation under discussion, the object 1 is a building. The block 2 marked "inspection and referral" represents the person making the inspection of the object 1 and who initiates certain actions as hereinafter discussed. The block 21 marked "comparison of information" is representative of the activity involving comparison of certain aspects of the object and information relating to those aspects contained in the information source. The activity represented by block 21 is generally visual and mental activity.

A system according to the invention is characterised by the simplification of the information gathering process so that relatively com-

plex pieces of information can be introduced into the system with relative ease. For that purpose pieces of information are coded and in some cases are identified in a user's kit by visual aids so that a relatively unskilled person is able to identify and record the relevant pieces of information. In Figure 1, the user's kit is represented by the block 3 marked "information source". The system is also characterised in that there are two types of input data or information and that those two types are related to provide an output of a useful nature. One type of input is pre-established and is represented by block 4 in Figure 1, and the other is initially unknown but is progressively gathered or established in the course of application of the system and is represented by block 5.

Pre-established information 4 may include labour and material costs, and gathered information 5 may include activities which will incur such costs. The system processes and relates the two types of information so as to provide an output 6, perhaps on demand, which, for example, gives the time required and cost to complete a particular project. If the project is extensive, the output may provide time and cost figures for individual stages and/or aspects of the project. The pre-established information 4 may be varied as required by appropriate input to the system.

In the case of a system applied to the maintenance and repair of buildings, initiation of the system requires visual inspection of the building by a person having the capacity to note those aspects of the building requiring maintenance or repair. The system minimises the degree of skill required of that person by providing a document or a series of documents which identifies the matters to be noted. For convenience, such matters will be referred to as actionable items and they are contained in the information source 3.

Some actionable items as contained in the information source 3, can be satisfactorily identified by a written description. In other cases, a photograph or other form of illustration may be provided to assist identification, and that may or may not have an accompanying written description. Figure 2 shows an example page of a diagnostic bulletin which forms the information source 3 in one embodiment of the invention.

Each actionable item is identified by a unique code which is referred to as the "remedy code" in Figure 2. In a preferred form of the invention, that code is of the bar-code type, or another machine readable type. Figure 3 shows a typical page of the diagnostic bulletin forming the information source 3, which has respective bar-codes 7 corresponding to each of the "remedy" codes of Figure 2. The code 7 for each item may include a plurality of components which combine to form a discrete identification for the particular item. For

example, as shown by Figure 4, each code 7 may include a generic field component 8—e.g., window—a family component 9—e.g., frame—and a specific component 10—e.g., timber. There are many possible variations to that basic theme. The code 7 may also include an action component 11 which goes to the nature of the maintenance or repair required—e.g., replace, restore, paint, etc.

The various actionable items may be identified in printed or other visually recognisable form in the diagnostic bulletin which forms the information source 3. That bulletin may also include guidelines for use.

Again taking the example of a building, the information source 3 may be divided into sections each of which deals with a particular aspect of the intended maintenance and repair inspection. As shown in Figure 4, there may be a primary section 12, a secondary section 13, and a basic section 14. Figure 4 shows two groups (a) and (b), of such sections 12, 13 and 14, since there may be a plurality of aspects of the building or object 1 which can be sectionalised for inspection purposes. Primary sections 12 may include sections dealing with internal and external aspects respectively of the building. Secondary sections 13 may go to particular parts of the building such as walls and floors. Basic sections 14 may go to the detail of such particular parts such as surface finish and apparent faults.

Within each basic section 14 there may be a number of actionable items, and as previously stated each is identified by a unique code 7. Each actionable item might also have noted beside it a quantity prompt or code 15 (Figure 3) which reminds the user that in addition to basic identification, that item requires a quantity input. In Figure 3, the quantity prompt 15 is shown by the letters "M" and "NO".

Assuming the code 7 for each actionable item is a unique bar-code, the user of the system will carry with him, in addition to the diagnostic bulletin or information source 3, an appropriate code reader 16 which is shown as part of the code selection block 17 of Figure 4. That reader 16 may be a bar-code reading wand of a known kind which responds electronically to passage across a bar-code 7. That response includes storage of information characteristic of the particular code 7 which has been read, and that information is stored in a retrievable manner.

The reader 16 preferably also has a keyboard which can be used for a variety of functions. That keyboard may be used to introduce an initiating command into the system. It may be used also for introducing background data such as the date of the inspection and the location and identity of the building inspected. A further possible use is to introduce quantity information such as size, area, vol-

ume, or number, for a particular actionable item. Such quantity information, however, could be generated by bar-codes, or other codes, additional to the actionable item codes.

- 5 Figure 4 includes a block 18 marked "additional information" which may include quantity information of the foregoing kind.

An example reader 16 of the foregoing kind is the "Telxon" PTC-701 portable tele-trans-
10 action bar-code reader. Other readers of suitable form and operation are obviously usable in a system according to the invention.

The reader 16 will usually have a limited storage capacity and consequently it is preferable to select one having sufficient memory for the task to be performed. In one form of the system according to the invention, the data which is progressively gathered by use of the reader is stored by the reader or an associated mini or microprocessor 19 (Figure 4).
15 Pre-established information 4 as previously referred to, however, may be stored at another and possibly remote facility, which in Figures 1 and 4 is shown by the block 20 marked "data processing". In such a case, provision is made for transmitting the gathered data from the storage unit 19 to the other facility 20 for processing.

Transmission of the foregoing kind may be direct such as through a telephone line, or it may be indirect. In the latter case, the data gathered by the reader 16 is dumped either progressively or as a complete package, into an appropriate storage unit 19 which is subsequently used for transmission to the other facility 20. That transmission can be effected in any appropriate fashion.

The gathered data may be retrieved as required either separately from the pre-established information 4 or after combination with that pre-established information 4. Also, such retrieval may involve selected parts only of the data, whether it be the gathered data and/or the pre-established data.

45 It will be apparent from the foregoing that a system as particularly described involves the following steps:

- (a) visual inspection of an object of interest,
- (b) breaking that inspection into a series of
50 predefined tasks, each of which is concerned with a particular actionable item of the object of interest,
- (c) as each inspection task is conducted, relating the item inspected to a preprepared description and/or illustration of an item of the same kind and which has a unique code associated therewith,
- (d) electronically storing and/or transmitting a signal which is representative of the code of
60 an inspected item which is thought to require action such as maintenance or repair,
- (e) electronically storing and/or transmitting another signal which is representative of the size and/or number of the inspected item referred to above and which modifies the first

signal to produce a resultant which identifies the item and its size and/or quantity, and

- (f) relating that resultant to pre-established and electronically stored data to produce an
70 output which is representative of the time and/or cost involved in taking the action referred to in (d) above.

The system therefore produces a package of information which constitutes an assessment of the condition of a particular item or a group of items, and further provides an estimate as to the likely time and cost required to restore that condition to an acceptable level if such restoration is considered necessary. It is therefore possible to substantially reduce the time and effort necessary to produce maintenance and repair estimates, particularly for large structures or installations.

It is a feature of the system that a relatively unskilled person can carry out the inspection and input the information gathered in the course of that inspection. Furthermore, because of the aids provided for identifying actionable items and inputting relevant information, the inspection can be carried out in much quicker time than under conventional procedures. That time could be reduced still further by adoption of additional aids such as sonic measuring devices which input directly into the electronic part of the system.

95 Various alterations, modifications and/or additions may be introduced into the constructions and arrangements of parts previously described without departing from the ambit of the invention as defined by the appended claims.

CLAIMS

1. A data processing system including use of means for storing information, data processing means, and an information source which provides a visually recognisable identification of each of a number of aspects of an object and allocates a unique code to each such aspect, said system involving electronic storage of pre-established information in said information storing means, visual inspection of a said object, visual referral to said information source as required during said inspection to determine the said code of at least one said aspect of said inspected object, transmitting a signal which is representative of said determined code to said data processing means, causing said data processing means to relate said signal to said pre-established information so as to thereby produce useful data, and extracting said useful data from said data processing means.

2. A system according to claim 1, wherein said code is a machine readable code, and code reading means is used to read said determined code and produce said code signal.

3. A system according to claim 2, wherein said code reading means includes a facility whereby additional information relating to said

inspected object can be introduced into said system on a selective basis and passed to said data processing means so as to influence the nature of said useful data.

- 5 4. A system according to any preceding claim, wherein additional information derived from said inspection of the object is converted into electronically transferable data, and said electronically transferable data is received by
- 10 said data processing means and is related to data communicated to said data processing means by said signal so as to thereby influence the nature of said useful data.
- 15 5. A system according to any preceding claim, wherein said information source includes primary information, secondary information and basic information for at least one said aspect.
- 20 6. A system according to any preceding claim, wherein each said code includes two or more components of a group of components comprising a generic field component, a family component, a specific component and an action component.
- 25 7. A system according to any preceding claim, wherein said information storing means forms part of said data processing means.
- 30 8. A data processing system including the steps of electronically storing pre-established information, gathering further information by visual inspection of an object, referring to a pre-prepared information source which allocates a unique code to each of a number of aspects of a said object, visually comparing
- 35 said gathered information with information contained in said information source and selecting at least one said code as a consequence of that comparison, and causing data processing means to electronically process
- 40 said pre-established information together with information representative of said selected code so as to thereby produce useful data.
- 45 9. A system according to claim 8, wherein said pre-established information is variable information and comprises a plurality of bits of information.
- 50 10. A system according to claim 8 or 9, wherein said further information is gathered on a step-by-step basis, individual pieces of that further information comprise respective said aspects and are compared with respectively relevant parts of said information source, and a said code is selected for each said aspect as that aspect is considered so that there is a
- 55 progressive selection of said codes.
- 60 11. A maintenance and repair assessment procedure involving use of a system according to claim 8, wherein said pre-established information includes labour cost and material cost information, and said gathered information includes information identifying the object to be maintained/repared, information concerning the nature of components of that object requiring maintenance/repair, information concerning the nature of materials involved in the
- 65

maintenance/repair, and information concerning the nature of the required maintenance/repair.

- 70 12. A procedure according to claim 11, wherein additional information of a quantitative nature is added to said gathered information as required.
- 75 13. A procedure according to claim 11 or 12, wherein a said code includes components for each of the various parts of said gathered information.
- 80 14. A data processing system substantially as herein particularly described with reference to what is shown in the accompanying drawings.

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